



# **Superfund Record of Decision:**

## **Grand Traverse Overall Supply, MI**

## **NOTICE**

The appendices listed in the index that are not found in this document have been removed at the request of the issuing agency. They contain material which supplement, but adds no further applicable information to the content of the document. All supplemental material is, however, contained in the administrative record for this site.



EPA/ROD/R05-92/195

Grand Traverse Overall Supply, MI

First Remedial Action - Final

Abstract (continued)

soil, followed by offsite disposal of excavated materials; filling three of the four seepage lagoons with gravel, followed by paving; backfilling the remaining lagoon and revegetating the area. In 1978, dry cleaning operations were discontinued, but the GTOS site remains active and continues to discharge wastes into the sanitary sewer system. This ROD addresses the potential risks posed by onsite ground water. As a result of previous removal actions, organic compounds present in low levels in soil, and organic and inorganic compounds present in ground water no longer pose an unacceptable risk to human health or the environment; therefore, there are no contaminants of concern affecting this site.

The selected remedial action for this site is the no action alternative; however, ground water monitoring for inorganics will continue for 1 year. EPA has determined that conditions at the site due to contamination by organic compounds pose no current or potential threat to human health or the environment. There are no costs associated with this no action remedy.

PERFORMANCE STANDARDS OR GOALS: Not applicable.

## DECLARATION FOR THE RECORD OF DECISION

### SITE NAME AND LOCATION

Grand Traverse Overall Supply Site, Greilickville, Michigan.

### STATEMENT OF BASIS

This decision document presents the selected remedial action for the Grand Traverse Overall Supply Site, in Greilickville, Michigan, which was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and is consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) to the extent practicable. This decision is based upon the contents of the Administrative Record for the site.

The State of Michigan does not concur with this Record of Decision.

### DESCRIPTION OF THE SELECTED REMEDY

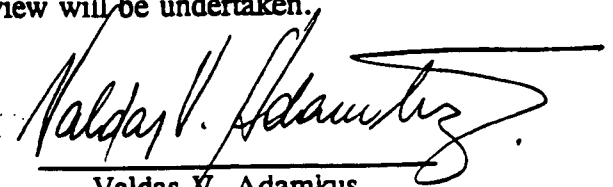
U.S. EPA (EPA) has selected "No Action."

### DECLARATION

EPA has determined that conditions at the site due to contamination by organic compounds pose no current or potential threat to human health or the environment. While the GTOS site does appear to exhibit trace amounts of inorganic contamination which result in slightly elevated calculations of potential future risk, EPA has also determined that the presence of these compounds does not appear to pose an unacceptable risk to human health or the environment. Accordingly, no further remedial action will be undertaken. EPA will, however, continue to monitor the inorganic contaminants in the groundwater for a period of twelve months.

As this is a decision for "No Action", the statutory requirements of CERCLA Section 121 for remedial actions are not applicable and no five year review will be undertaken.

Feb. 3<sup>rd</sup>, 1992  
DATE

  
Valdas V. Adamkus  
Regional Administrator

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**GRAND TRAVERSE OVERALL SUPPLY**

**GREILICKVILLE, MICHIGAN**

**SUMMARY OF REMEDIAL ALTERNATIVE SELECTION**

**FEBRUARY 1992**



## **DECISION SUMMARY**

### **I. SITE DESCRIPTION**

Grand Traverse Overall Supply Company (GTOS) site is located in Greilickville, Michigan, approximately 1-1/2 miles north of the city limits of Traverse City, Michigan (Figure 1). The 3.9 acre site is in the SE 1/4 of section 28, T28N, R11W, Elmwood Township, Leelanau County, located just west of Highway M-22, on the north side of Cherry Bend Road and south of Cedar Creek (Figure 2).

The area surrounding the GTOS facility is primarily residential. The Norris Elementary School is directly east of GTOS, and east of the school are residential homes. The Elmwood Volunteer Fire Department is south of GTOS, followed by more residential homes. Residential homes border GTOS to the west; to the north is Cedar Creek.

### **II. SITE HISTORY AND ENFORCEMENT ACTIVITIES**

Grand Traverse Overall Supply Company performs commercial laundering for industrial clothing. The laundry facility began operations in 1953. A dry cleaning facility was added in 1968. Until December 1977, the laundry wastes and process wastes from dry cleaning operations were discharged to seepage lagoons and a dry-well on the site. Cooling water used in dry cleaning operations was discharged to the Cedar Creek from 1968 to 1978. The Company began discharging its laundry and process wastes to the sanitary sewer system in December 1977, and the cooling water was also diverted to the sanitary sewer system beginning in 1978. Dry cleaning operations at GTOS were discontinued in 1987. The company is operating on the site at the present, and is discharging the wastes into the sanitary sewer system.

In April 1978, traces of perchloroethene (PCE), trichloroethene (TCE), and 1,2 dichloroethene (1,2 DCE) were detected in the water supply of Norris Elementary School, located immediately east of the GTOS site. The Michigan Department of Public Health condemned the school well water for consumption and conducted sampling of additional wells in the area. The sampling program confirmed the contamination of 10 drinking water wells. The GTOS site was considered the likely source of the contaminants.

Remedial action was taken by GTOS under Michigan Department of Natural Resources (MDNR) supervision from 1978 to 1980. This included replacing contaminated drinking water wells with new wells that extended into a deeper uncontaminated semi-confined aquifer, and excavating the on-site dry well and adjacent contaminated soils, with off-site disposal of excavated materials. In addition, three of the four lagoons were gravel filled, covered with asphalt, and converted to a parking lot. The fourth lagoon was backfilled and ultimately returned to a grassy area.

The MDNR performed a biological evaluation of the Cedar Creek in October-November of 1978 to determine if wastewaters from the GTOS site, discharged into the lagoons and to the Cedar Creek, had damaged the indigenous aquatic plant and communities in the creek. The study concluded that the aquatic animal community in the Cedar Creek, downstream from GTOS was seriously degraded compared to the upstream community.

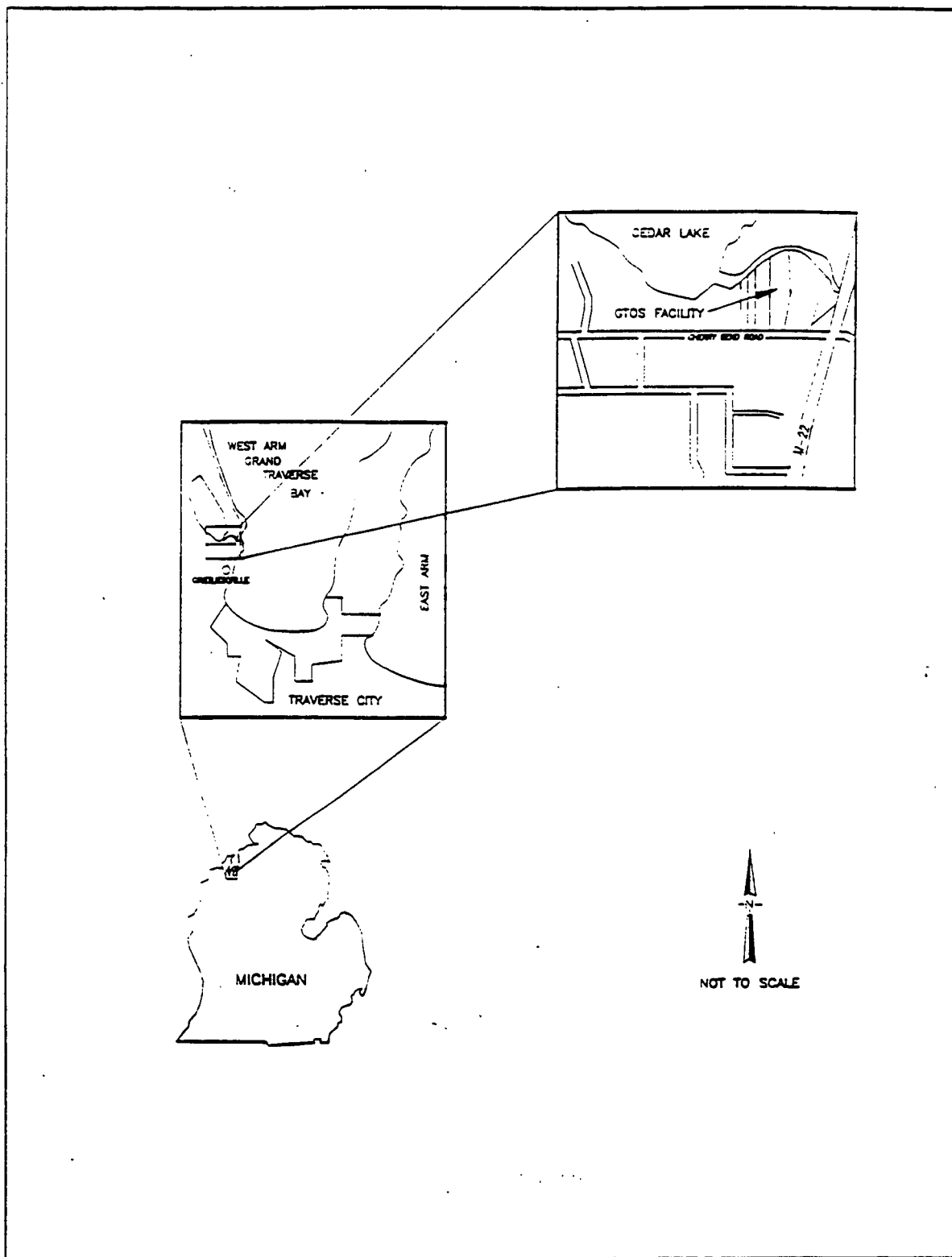


Figure 1 Area Map

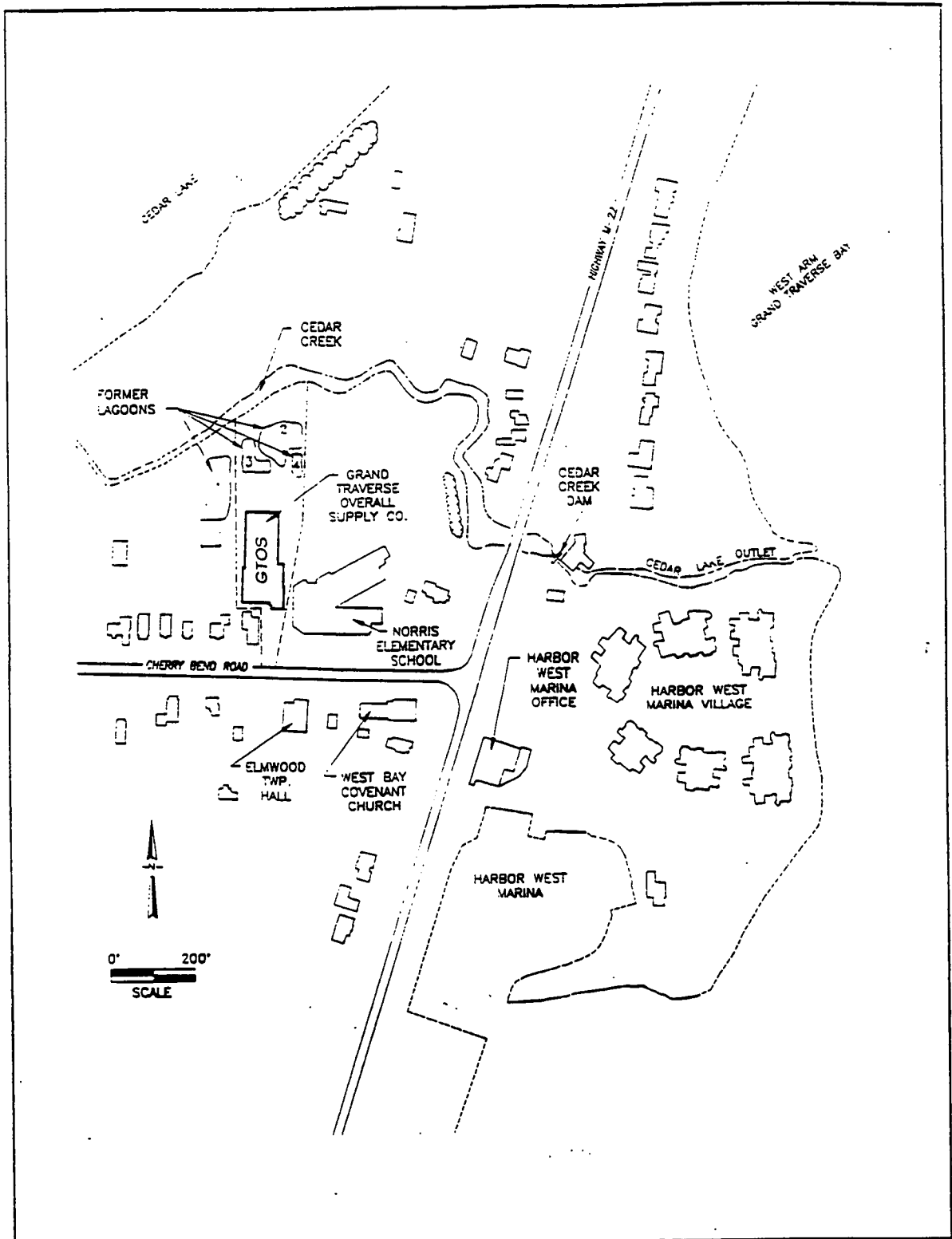


Figure 2 Site Map

The MDNR also conducted a hydrogeologic investigation of the site and surrounding area and issued a report of the investigation, in February 1981. The report concluded that the GTOS site had been the source of the TCE, PCE, and 1,2 DCE contamination of the shallow useable unconfined aquifer in the area.

The site was placed on the National Priorities List (NPL) in September 1983 because of groundwater contamination of the useable unconfined aquifer with PCE and TCE.

### **III. HIGHLIGHTS OF COMMUNITY PARTICIPATION**

On November 29, 1989 EPA hosted a Remedial Investigation Kick-off Meeting at the Elmwood Township Hall, Michigan. Approximately 30 citizens attended this meeting.

The Proposed Plan was released to the public for comment on October 15, 1991. The public comment period concluded November 14, 1991. The Proposed Plan provided the public with the opportunity to request a Public Meeting to discuss the Remedial Investigation (RI) findings and the proposed alternative.

The public participation requirements of CERCLA sections 113 (k) (2) (B) (i-v) and 117 have been met in the remedy selection process. This decision document presents the selected remedial action for the GTOS site, in Michigan, chosen in accordance with CERCLA, as amended by SARA and, to the extent practicable, the NPL. The decision for this site is based on the administrative record.

### **IV. SCOPE & ROLE OF RESPONSE ACTION**

EPA recommends that no further remedial action be taken at the GTOS site for the following reasons. Organic compounds, found in low levels in the soils, pose no current or potential threat to human health or the environment. Levels of organic and inorganic compounds present in groundwater do not appear to pose an unacceptable risk to human health or the environment.

No five year review will be undertaken, but EPA will continue to monitor the groundwater for a period of twelve months.

### **V. SITE CHARACTERISTICS**

The RI was conducted in two stages. Stage I began November 1989 and was completed in February 1990, stage II was completed in November 1990. The RI also included a Risk Assessment to evaluate the level of risk to human health and the environment. This section summarizes the analysis presented in the RI report:

#### **A) Site Topography**

The GTOS site is located near the base of the Leelanau Peninsula. The peninsula and surrounding area are dominated by landforms left by the Wisconsin glaciation (Martin 1957). The GTOS site is relatively flat, with an average ground surface elevation of 600 feet above mean sea level (MSL; U.S.G.S., 1983). The relatively flat topography at the site is due to its

being part of ancestral lake beds formed when the Wisconsin glaciation retreated. To the east of Highway M-22 (approximately 1,000 feet east of GTOS), the elevation sharply drops approximately 20 feet to the shore of the West Arm of Grand Traverse Bay.

Approximately 1 mile west of the study area, the surface elevation begins to rise to a maximum elevation of approximately 1,100 feet, and the topography becomes rolling hills. Sandy glacial moraines and sand dunes along ancestral shorelines are also found west of the GTOS site.

#### **B) Site Geology**

The GTOS site is covered by glacial surficial deposits. The underlying bedrock formations in the region are (in descending order) the Devonian Ellsworth shale, the Devonian Antrim shale, and the Devonian Traverse limestone. These formations outcrop and pinch out from southeast to northwest, respectively, as part of the Michigan Basin structure.

The glacial surficial deposits form a sandy soil at the GTOS site. The soil is classified as Kalkaska-East Lake loamy sand. These deposits are lacustrine in origin and were formed by the glacial lakes ancestral to the Great Lakes.

According to boring logs, the subsurface sequence of formations at GTOS consists of 4 to 5 feet of sand mined with gravel, overlying a 5 to 10 foot layer of sand and large cobbles. Beneath this horizon is a layer of sand and gravel (Kimmel, 1981).

#### **C) Site Surface Water Hydrology**

The West Arm of Grand Traverse Bay, Cedar Lake, and Cedar Creek are the major surface water bodies near the GTOS site. The surface and subsurface hydrology around the GTOS site is controlled by these water bodies. The Cedar Lake watershed encompasses 3,946 acres, with the lake occupying 253 acres. The maximum depth of the lake is 13.7 meters in a small area near the outlet. The watershed is drained by Cedar Creek, a perennial stream. Cedar Creek passes over a dam/spillway located just east of Highway M-22, and then discharges to the West Arm of Grand Traverse Bay.

#### **D) Site Groundwater Hydrology**

Two aquifers are located beneath GTOS: an unconfined aquifer that is about 45-65 feet thick and a semi-confined aquifer that is at least 55 feet thick, beneath the unconfined aquifer. Figure 3 represents a hydrologic cross section of the area of study. The flow of groundwater is generally in a south/southeast direction. The unconfined aquifer is recharged by infiltration of precipitation throughout the study area. Recharge to the lower semi-confined aquifer probably occurs via vertical infiltration through the confining unit.

MDNR concluded that the creek was in a semiperched state above the dam and that some groundwater therefore flows beneath the creek. Due to the dam located on Cedar Creek, the creek discharges to the unconfined aquifer upstream from the dam. Downstream from the dam, the groundwater discharges to the creek.

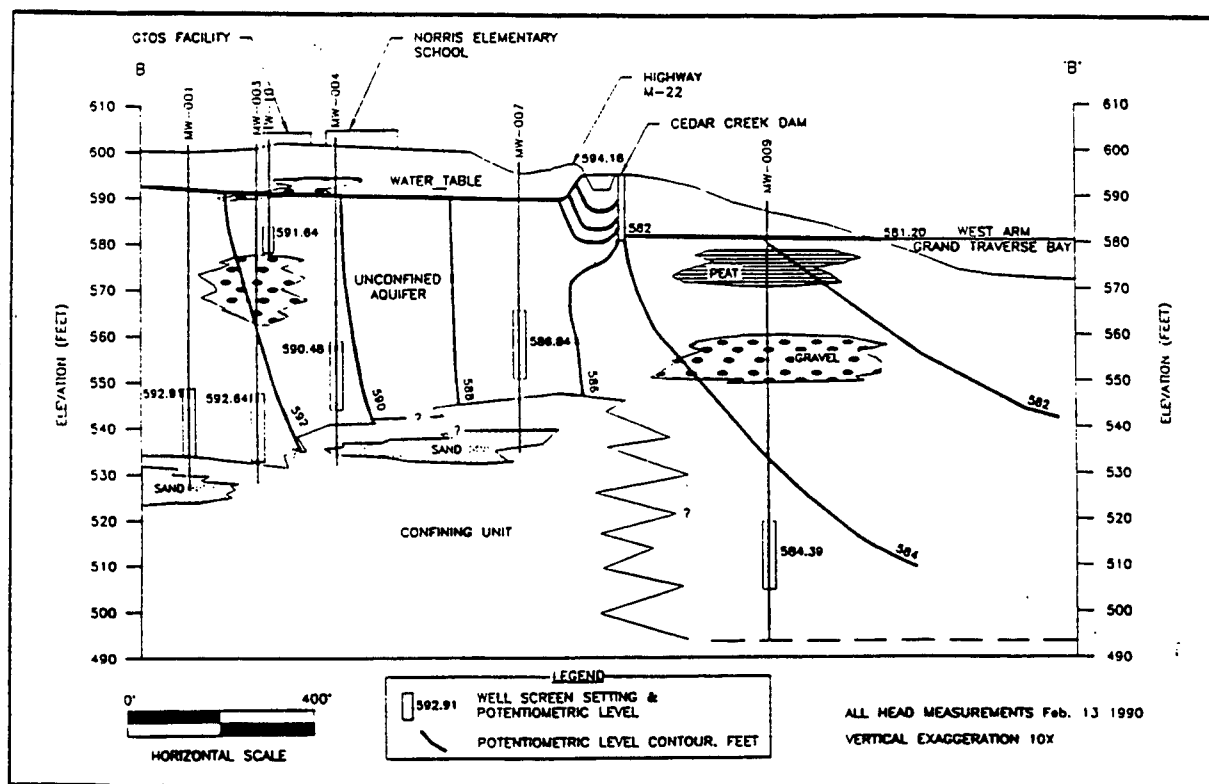


Figure 3 Hydrologic Cross Section of GTOS site

## E) EXTENT OF CONTAMINATION

### 1) Soils

The first stage of sampling of the RI included five soil borings and the collection of 67 soil samples from depths of 3 to 68 feet. These samples were analyzed for VOCs, SVOCs, and inorganics. During the second stage of sampling additional soil sampling was conducted in the lagoon areas. A total of 16 auger borings were drilled, and 22 soil samples were collected for analysis of VOCs.

The concentrations of inorganics detected on the soil samples fall within typical average background concentrations for the State of Michigan (see Table 1).

Soil samples taken from the five potential source areas, the dry well area and the four former lagoons, exhibited slight contamination, primarily by organic compounds. Lagoon areas 2, 3, and 4 have been converted to a parking lot. The dry well area and former lagoon No. 1 are

**Table 1 Soil Background Data-Inorganic Contaminants in  $\mu\text{g/kg}$**

<i>Contaminant</i>	<i>Michigan Background Soil Data - Sands</i>	<i>U.S. National Background</i>
Aluminum	1317	71000
Antimony	NA	6
Arsenic	0.8	5-6
Barium	10.5	430-500
Beryllium	NA	6
Cadmium	0.6	0.06
Calcium	NA	13700
Chromium	3.3	100
Cobalt	2.5	8
Copper	4.6	20-30
Iron	1630	38000
Lead	16.3	29
Magnesium	NA	5000
Manganese	199.3	600-850
Mercury	0.04	0.098
Nickel	6.1	40
Potassium	NA	14000
Selenium	0.23	0.4
Silver	0.2	0.4
Thallium	NA	0.2
Vanadium	NA	100
Zinc	11.3	50

used as storage areas. Figures 4 & 5 show soil sampling locations. Table 2 provides a summary of the data. TCE and/or PCE were detected in the dry well area, former lagoon No. 1, and former lagoon No. 3. Most of the concentrations were less than  $400 \mu\text{g/kg}$ , except in a sample from former lagoon No. 3, where tetrachloroethene was found at  $3,500 \mu\text{g/kg}$ . Samples from former lagoons No. 2, No. 3, and No. 4 also contained BTEX compounds (benzene, toluene, ethyl benzene, and xylene), which are major constituents of hydrocarbon fuels. Concentrations of these compounds were less than  $500 \mu\text{g/kg}$  except for one detection of xylene at  $960 \mu\text{g/kg}$  in former lagoon No. 2. In the dry well area and in the four former lagoons, a number of organic Tentatively Identified Compounds (TICs) were found. Concentrations of these TICs were as high as  $24,000 \mu\text{g/kg}$ , although these were estimated values. However, since several of the TICs detected in the source areas were also detected in the background soil sample, some of the compounds may be naturally occurring. These TICs were primarily long chain aliphatic hydrocarbons and aromatic compounds.

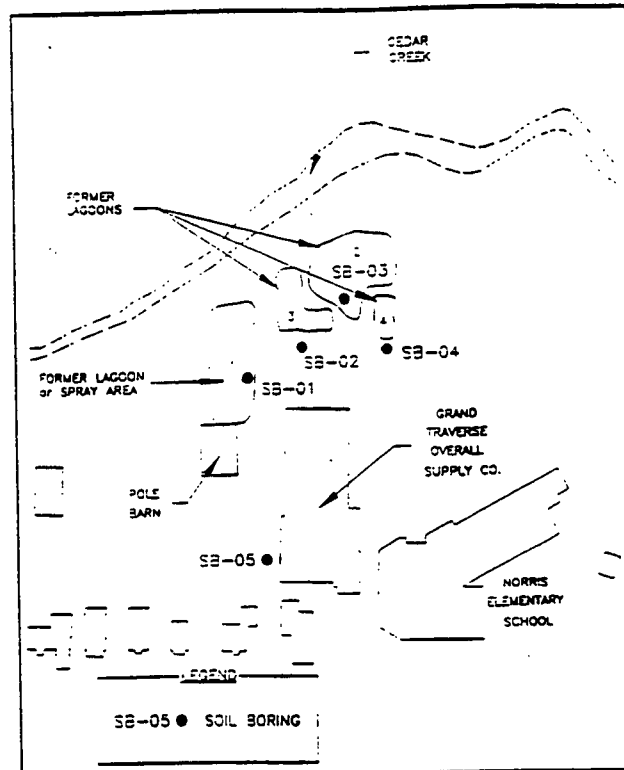
## **2) Surface Water and Stream Sediment**

Six stream sediment samples and three surface water samples from the Cedar Lake Outlet were taken during the first stage of sampling of the investigation (See Table 3). Figure 6 shows

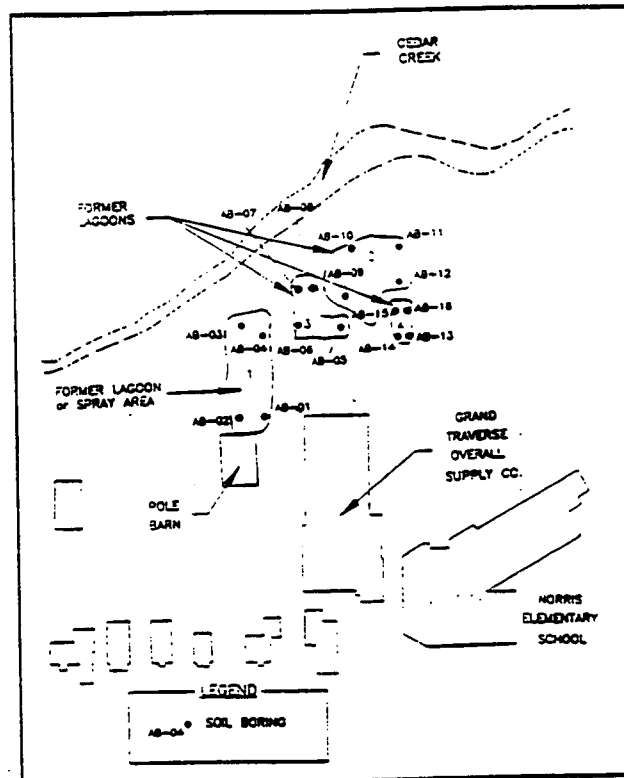
Table 2 Analytes Detected in Soil Samples at GTOS

Chemical ( $\mu\text{g/Kg}$ )	Frequency of Detection	Range of Detected Concentrations	
		Minimum	Maximum
<u>Volatiles</u>			
Methylene Chloride	4/22	1	6
Acetone	6/23	8	38
Trichloroethene	1/3	4	4
Tetrachloroethene	4/20	2	3500
Toluene	2/19	1	170
Ethybenzene	1/18	41	41
Xylenes(total)	4/18	12	960
<u>Semivolatiles</u>			
bis(2-Ethylhexyl)Phtalate	3/4	640	15000
Di-n-Octyl Phtalate	1/1	43	43
<u>Inorganics (mg/Kg)</u>			
Aluminum	5/5	601	1330
Arsenic	2/4	0.31	0.68
Barium	5/5	3.4	18.7
Calcium	5/5	10700	78100
Chromium	5/5	3.2	8
Cobalt	1/1	4.4	4.4
Copper	5/5	9.3	46.3
Iron	5/5	1280	3300
Lead	5/5	0.99	44.1
Magnesium	5/5	3460	12000
Manganese	5/5	17.2	95.4
Mercury	1/3	0.59	0.59
Nickel	1/1	3.7	3.7
Potassium	2/2	127	187
Sodium	3/3	108	151
Vanadium	5/5	2.2	5.7
Zinc	5/5	7	37.6





**Figure 4 Phase I Soil Boring Locations**



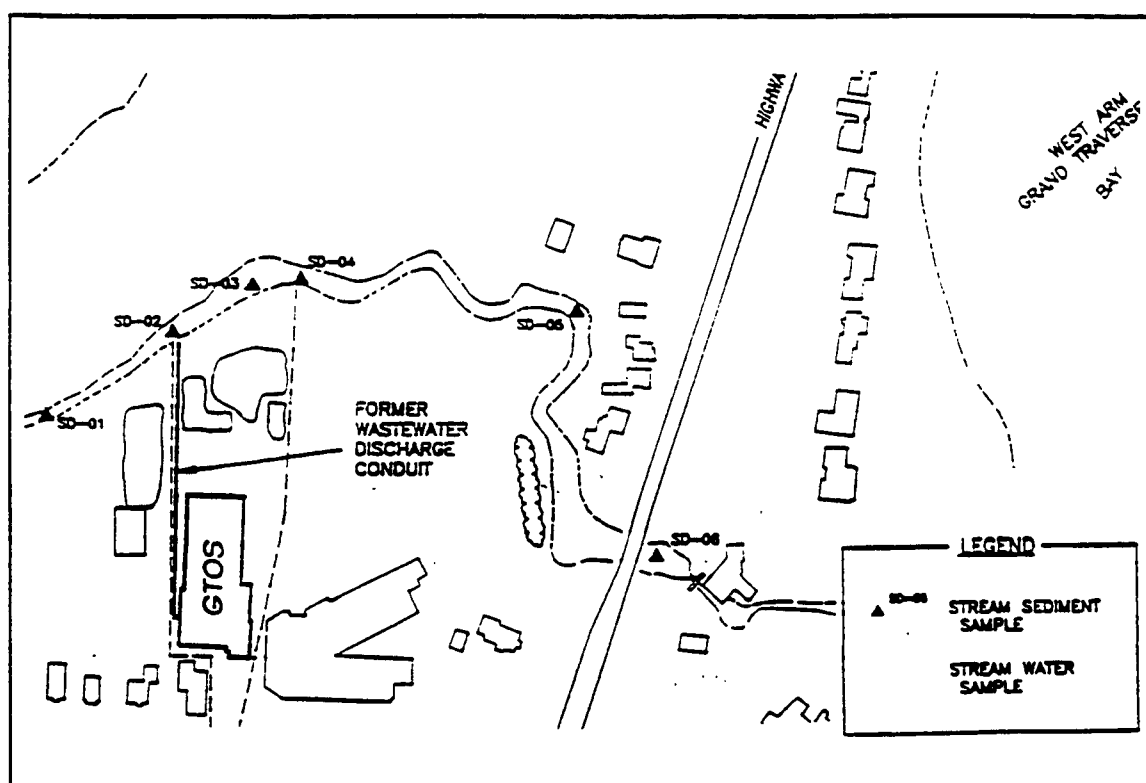
**Figure 5 Phase II Soil Boring Locations**

POOR QUALITY  
ORIGINAL

**Table 3 Organic Analytes Detected in Sediment Samples at GTOS**

Chemical ( $\mu\text{g/l}$ )	Frequency of Detection	Range of Detected Concentrations	
		Minimum	Maximum
<u>Volatiles</u>			
Acetone	2/5	72	520
Carbon Disulfide	1/5	46	46
2-Butanone	1/5	66	66
Toluene	5/5	65	1200

surface water and sediment sampling locations. Toluene was detected in sediments upstream and downstream from the site. Except for a trace amount of toluene in an upstream sample, no VOCs were detected in the surface water samples. The most likely source of the toluene in the surface water and sediments is the use of fuel in boats on Cedar Lake, and possible releases from storage facilities at service stations and marinas in the area.



**Figure 6 Stream Surface Water and Sediment Sample Locations**

### 3) Groundwater

While low levels of chlorinated hydrocarbons and BTEX compounds were detected in all three of the groundwater monitoring zones of the field investigation: the shallow portion of the unconfined aquifer, the deep portion of the unconfined aquifer, and the semi-confined aquifer, the concentrations and quantities of contaminants detected were not the same for both rounds. The concentrations detected on stage II were lower. Low levels of inorganic compounds were also detected in the unconfined aquifer. However, no maximum contaminant levels (MCLs) other than antimony were exceeded. The presence of antimony at levels greater than its MCL of 10 µg/l was not considered significant due to unreliable data resulting from the sample blanks containing high levels of antimony. Antimony was eliminated from further consideration. During the first stage of sampling, 43 groundwater samples were collected from 22 monitoring wells and 36 samples were collected from 28 residential wells. These samples were analyzed for Volatile Organic Compounds (VOCs) and Semi-Volatile Organic Compounds (SVOCs). Six samples from the monitoring wells were analyzed for inorganics. In the second stage, samples were collected from 10 monitoring wells and 10 residential wells and analyzed for VOCs.

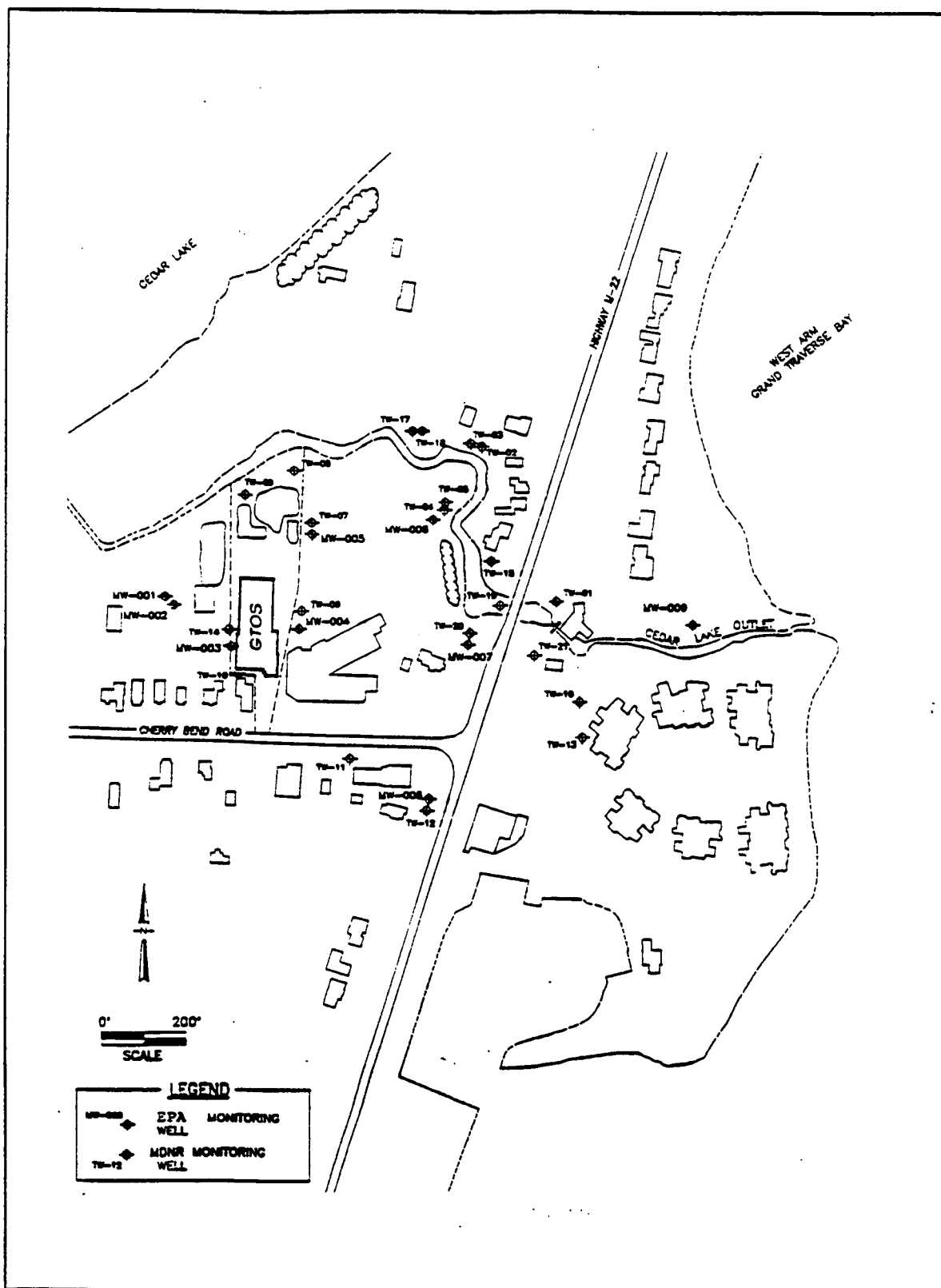
Existing MDNR monitoring wells were paired with new EPA monitoring wells to form nests of wells that would provide samples throughout the unconfined aquifer. The MDNR monitoring wells were screened in the shallow part of the unconfined aquifer; monitoring wells installed by EPA were screened in the deep part of the unconfined aquifer. Figure 7 shows the locations of the monitoring wells. Most of the residential wells were screened in the semi-confined aquifer. Figure 8 shows the location of the residential wells. Table 4 summarizes the results of the groundwater stages of sampling. The results from stage I and stage II have been combined.

#### a) Unconfined Aquifer

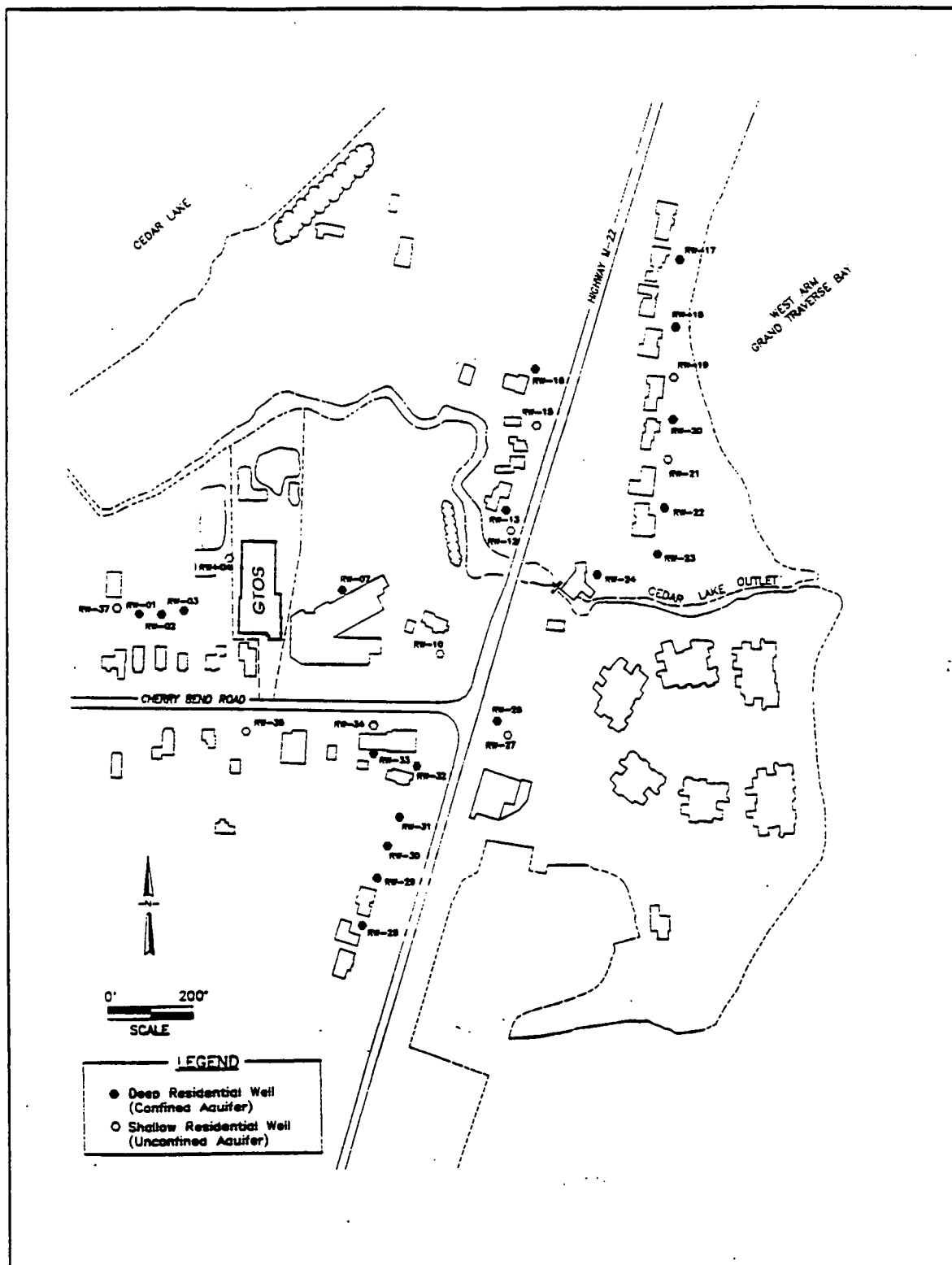
Very low concentrations of three semivolatile compounds were found samples taken from the upper unconfined aquifer, indicating that the GTOS site does not contribute to semivolatile contamination of the groundwater. In the stage I sampling of the shallow portion of the unconfined aquifer, trichloroethene, tetrachloroethene, cis-1,2-dichloroethene and toluene were detected in low concentrations (0.6 to 3 µg/l) downgradient of the source areas of GTOS. Similar concentrations of trichloroethene and cis-1,2-dichloroethene were also detected in the background well upgradient of GTOS. In the stage II sampling, cis-1,2-dichloroethene, trans-1,2-dichloroethene, trichloroethene, and 1,2-dichlorobenzene (0.5 to 3.3 µg/l) were detected downgradient of the source areas.

In the deep portion of the unconfined aquifer, the first stage of sampling detected tetrachloroethene, trichlorofluoromethane, bromomethane, chlorobenzene, and 2-chlorotoluene in low concentrations (0.07 to 0.7 µg/l) downgradient of the source areas of GTOS. In the second stage of sampling for the deep portion of the unconfined aquifer, only tetrachloroethene was detected (0.95 µg/l).

During stage I of sampling, low levels of inorganic compounds were detected in the shallow and deep portions of the unconfined aquifer. These included aluminum, arsenic, barium, calcium, copper, lead, magnesium, manganese, potassium, silver, sodium, vanadium and zinc. Many of these same inorganic compounds were also found in samples designated as background and in the tap water obtained from the municipal water supply available at the Traverse City Fire Station. The municipal water, used in the remedial investigation, is pumped from the East Arm of Grand Traverse Bay and treated.



**Figure 7 Monitoring Wells Locations**



**Figure 8 Residential Wells Locations**

**Table 4 Analytes Detected in Groundwater Samples at GTOS**

Chemical (μg/l)	Frequency of Detection	Range of Detected Concentrations	
		Minimum	Maximum

UPGRADIENT MONITORING WELLS			
<u>Volatiles</u>			
Methylene Chloride	2/2	1	2
1,2-Dichloroethene(total)	1/2	2	2
Trichloroethene	1/2	3	3
<u>Semivolatiles</u>			
Phenol	1/1	1	1
Fluorene	1/1	0.09	0.09
bis(2-Ethylhexyl)Phtalate	1/1	0.1	0.1
<u>Inorganics</u>			
Antimony	2/2	18.6	21.1
Arsenic	1/2	1.4	1.4
Barium	2/2	12.8	28.2
Calcium	2/2	50600	77500
Chromium	2/2	6.1	7.6
Copper	2/2	4.6	7.7
Iron	2/2	81.3	428
Lead	1/2	3.9	3.9
Magnesium	2/2	15400	16700
Manganese	2/2	3.8	52
Nickel	1/2	15.6	15.6
Potassium	2/2	641	843
Selenium	1/2	2.5	2.5
Sodium	2/2	4900	6500
Thallium	1/2	1.1	1.1
Vanadium	2/2	3.4	5
Zinc	2/2	8.1	19.4

Table 4 (Cont.) Groundwater Samples

Chemical ( $\mu\text{g/l}$ )	Frequency of Detection	Range of Detected Concentrations	
		Minimum	Maximum
<b>RESIDENTIAL WELLS</b>			
<u>Volatiles</u>			
Bromomethane	2/24	0.29	0.38
1,1-Dichloroethene	1/24	0.33	0.33
1,2-Dichloroethene(total)	1/1	0.07	0.07
1,2-Dichloroethane	1/24	0.09	0.09
Carbon Tetrachloride	1/24	0.09	0.09
Bromodichloromethane	1/24	1.32	1.32
1,2-Dichloropropane	1/24	0.10	0.10
Trichloroethene	1/24	0.14	0.14
Dibromochloromethane	1/24	0.73	0.73
Bromoform	1/24	0.14	0.14
Tetrachloroethene	6/24	0.05	0.24
Styrene	2/24	0.09	0.10
Bromobenzene	1/24	0.08	0.08
Bromochloromethane	1/4	0.14	0.14
sec-Butylbenzene	1/24	0.13	0.13
tert-Butylbenzene	1/24	0.10	0.10
2-Chlorotoluene	3/24	0.12	0.15
4-Chlorotoluene	1/24	0.10	0.10
1,2-Dibromoethane	1/1	0.03	0.03
1,3-Dichloropropane	1/24	0.04	0.04
2,2-Dichloropropane	1/1	0.07	0.07
Isopropylbenzene	1/24	0.12	0.12
n-Propylbenzene	2/24	0.15	44
1,1,1,2-Tetrachloroethane	1/24	0.06	0.06
1,2,3-Trichloropropane	1/1	0.06	0.06
1,3,5-Trimethylbenzene	1/24	0.11	0.11
1,2,4-Trimethylbenzene	1/24	0.10	0.10
<u>Semivolatiles</u>			
1,2-Dichlorobenzene	1/24	0.09	0.09
1,3-Dichlorobenzene	1/24	0.07	0.07
1,2,4-Trichlorobenzene	1/24	0.58	0.58
Hexachlorobutadiene	2/24	0.17	0.35

Table 4 (Cont.) Groundwater Samples

Chemical ( $\mu\text{g/l}$ )	Frequency of Detection	Range of Detected Concentrations	
		Minimum	Maximum
<b>ON-SITE MONITORING WELLS</b>			
<u>Volatiles</u>			
Methylene Chloride	6/20	0.5	0.9
Carbon Disulfide	4/20	2	4
1,2-Dichloroethene(total)	1/20	8.5	8.5
1,1,1-Trichloroethene	5/20	0.5	7
Trichloroethene	3/20	0.5	1.7
Bromodichloromethane	1/20	0.6	0.6
Toluene	1/20	0.6	0.6
Tetrachloroethene	3/20	0.9	3.3
<u>Semivolatiles</u>			
1,2-Dichlorobenzene	1/20	0.6	0.6
bis(2-Ethylhexyl)Phtalate	2/2	0.3	0.3
<u>Inorganics</u>			
Aluminum	5/6	79	797
Antimony	4/6	18	26.2
Arsenic	4/6	1.3	8.6
Barium	6/6	18.8	52.9
Cadmium	1/6	2.6	2.6
Calcium	6/6	66100	93400
Chromium	1/6	10.3	10.3
Copper	5/6	3.4	6.6
Iron	6/6	529	1960
Lead	6/6	1.2	23
Magnesium	6/6	13100	20800
Manganese	6/6	12.6	204
Nickel	1/6	15.2	15.2
Potassium	6/6	725	1570
Selenium	1/6	1.7	1.7
Silver	5/6	9.2	12.6
Sodium	6/6	3510	8230
Vanadium	6/6	5.2	11.9
Zinc	6/6	5.2	1680



## **b) Semi-confined Aquifer**

In the semi-confined aquifer, 33 individual compounds were detected downgradient of the GTOS site in low concentrations (0.09 to 0.58  $\mu\text{g/l}$ ). The downgradient sample detected halogenated compounds, commonly used as solvents, and substituted aromatic compounds, commonly used in fuels. The upgradient sample detected substituted aromatic compounds only. No VOCs were detected in the stage II of sampling of the semi-confined aquifer.

## **VI. RISK ASSESSMENT**

The analytical data collected during the RI indicated the presence of contaminants in various media. Pursuant to the NCP, a baseline risk assessment was performed based on present conditions at the site. The baseline risk assessment determines actual or potential risks or toxic effects the chemical contaminants at the site pose under current and future land use assumptions. The risk assessment assumes no corrective action will take place and that no site use restrictions or institutional controls such as fencing, groundwater use restrictions or construction restrictions will be imposed. The baseline risk assessment included the following specific assumptions:

- Contaminated aquifers may be used as a drinking water source;
- The site may be used for residential development;
- Access restrictions such as fencing will not preclude potential trespassers from getting into the site; and
- No groundwater use restrictions will be enforced.

### **A) Contaminant Identification**

The media of concern for human exposure were identified as groundwater, soil, sediment, and surface water. A list of contaminants found at the site was developed to determine the contaminants of concern for GTOS. Those contaminants that were reported very infrequently and at low concentrations were eliminated from further consideration as contaminants of concern. All carcinogenic contaminants were included as contaminants of concern. The compounds selected as contaminants of concern for the baseline risk assessment include:

Methylene Chloride	Trichloroethane	1,2-Dichlorobenzene
Carbon Tetrachloride	1,1,1,2-Tetrachloroethane	Hexachlorobutadiene
Bromomethane	1,2-Dibromoethane	bis(2-Ethylhexyl)phthalate
Bromodichloromethane	Acetone	Di-n-Octylphthalate
Dibromochloromethane	1,2-Dichloropropane	Arsenic
Bromoform	Toluene	Barium
Carbon Disulfide	2-Chlorotoluene	Cadmium
1,2-Dichloroethane	Xylenes (Total)	Copper
1,2-Dichloroethene (cis and trans)	Ethylbenzene	Lead
1,1-Dichloroethene	Styrene	Manganese
1,1,1-Trichloroethane	2-Butanone	Mercury
Silver	Vanadium	Zinc

Analytical data gathered from the residential wells and monitoring wells sampled indicated no exceedances in groundwater of Federal MCLs for organic constituents. Among the inorganics, only antimony exceeded the MCL; however, since the sample blank was contaminated, the presence of antimony is questionable and antimony was not selected as a contaminant of concern.

## **B) Exposure Assessment**

Potential exposure to contaminants from the GTOS site was evaluated for the following potential pathways or routes of exposure:

### **a) For site workers and site trespassers:**

- Ingestion of soil
- Dermal absorption of contaminants in soils
- Incidental ingestion of sediments and surface water.

### **b) For residents:**

- Ingestion of soil
- Ingestion of groundwater
- Dermal absorption of contaminants in soils
- Dermal absorption of contaminants in groundwater
- Inhalation of vapors from use of groundwater
- Incidental ingestion of sediments and surface water.

## **C) Calculation of Current and Future Risks**

Current risks for receptor groups were based on concentrations of contaminants actually found during monitoring in and around the site. For example, current risks for trespassers and site workers use concentrations of contaminants found in the soil at the site during the RI. Current risks to residents use concentrations found in the groundwater taken from residential wells.

Potential future risks for site workers and trespassers are based on the assumption that the known current environmental concentrations remain the same. Potential future risks for residents are based on the conservative assumptions that future concentrations of contaminants in residential wells will be equal to the highest concentration of contaminants found in groundwater directly under the site, and that a residence could be built directly on the site, potentially exposing adults and children to contaminants in the soil through direct contact.

## **D) Assumptions**

Various assumptions were used for the performance of the baseline risk assessment. By means of the exposure assessment, actual and potential exposure pathways were identified to characterize potentially exposed populations, and to determine the extent of exposure. Behavioral and physiological factors influencing exposure frequency and levels are presented in a series of exposure scenarios as a basis for quantifying contaminant intake levels by receptor populations for each identified pathway. The results of the exposure analysis are then applied in the risk characterization. The scope of this risk assessment included an evaluation of both current and future human health and environmental risks. All the assumptions used in the risk assessment are explained in detail in the following sub-sections.

### **1. Exposure Pathways**

The assessment of pathways by which human receptors may be exposed to contaminants from the GTOS site includes an examination of possible contaminant source areas and existing migration pathways and exposure routes, as well as those that may be reasonably expected in the future. The determination of exposure pathways is made by a careful evaluation of the current extent of contamination in and around the site in relation to local land and water uses, and the results of a fate and transport assessment that evaluates contaminant migration pathways.

The site investigations performed at GTOS have confirmed the presence of low levels of contaminants of potential concern in soils and groundwater. The probable source of at least some of this contamination, the former lagoons and the dry well located on site, have been excavated and filled. The area has been covered in asphalt and gravel and is currently used as a parking lot.

Contaminants detected at the GTOS site may migrate off site or may persist on site. Some contaminants of concern, such as the VOCs, are expected to be relatively mobile and may be transported from the soil to the groundwater. Once in the groundwater, these mobile contaminants may be transported downgradient. Other chemicals, such as the inorganics and semivolatiles, are expected to be less mobile and may remain in the source area for much longer periods of time.

Based on the evaluation of site characteristics it was determined that groundwater is the contaminated medium of most concern on site and the most important mode of contaminant transport at GTOS. Fate processes, other than dispersion, volatilization, and adsorption, are presumed to be insignificant in groundwater.

During rainy seasons, water can infiltrate contaminated soils and carry dissolved organic and inorganic compounds with it. Part of the contaminants in the leachate is adsorbed by the soil underneath the contaminated soil zone. The other part of the contaminants, which is desorbed from the soil particles, continues to move downward and reaches the groundwater. However, since the former lagoon areas at the site have been filled, and the area has been covered with asphalt and gravel, percolation of rainwater through the asphalt is not expected.

Contaminants in the surface soil are not expected to migrate directly from the GTOS site via surface water as the site is relatively flat and the former lagoon areas are predominantly covered with either asphalt or gravel.

Under current site conditions, volatilization is not expected to be significant because the asphalt and gravel cover minimizes volatilization of the subsurface contaminants, and because the sandy soils at the site are more likely to lose contaminants through the leaching process.

Groundwater is expected to discharge to surface water with a significant loss of contaminants. The distance from the site to the bay is less than 1/2 mile. As contaminated groundwater migrates downgradient toward this discharge point, a significant loss of VOCs is expected through volatilization, retardation and degradation.

Contaminants in the groundwater can volatilize to the soil pore spaces and finally reach the surface of the soil and the surrounding air by diffusion. Volatilization from a water table aquifer is affected by depth to the water table and moisture content of the unsaturated soil column. Since the former lagoon areas have been covered with gravel and asphalt, volatilization from groundwater to the air is not expected to be significant.

Contaminants in groundwater which is pumped to the surface for use may volatilize directly to the air. Contaminated groundwater used as a domestic or non domestic water supply could result in a significant loss of contaminants through volatilization to the atmosphere. Through agitation, heating, or other mechanical handling, VOCs would be expected to volatilize rapidly, releasing contaminants to the atmosphere.

A conceptual exposure model for the GTOS site, which integrates and summarizes the information concerning source areas, contaminant migration pathways, and exposure routes into a combination of exposure pathways is presented in Table 5. This model identifies the key potential release mechanisms, transport media, exposure points, exposure media, exposure routes, and receptors for each contaminated source. All potential exposure pathways and receptors are included in this model, including some that were not quantified in the RI.

#### **a) Risks from Soil**

Site access is partially restricted by a 6 foot fence which separates the site from the adjacent schoolyard. This is not, however, expected to prevent children from entering the site. Therefore, both site workers and child trespassers were examined receptor groups under the current land use scenario.

Individuals entering the site for various reasons, including work activities or trespassing, may be exposed to contaminants by direct contact, especially during excavation activities. Contaminants in the soils may be absorbed through the skin on contact or accidentally ingested by unintentional hand to mouth activities.

Contaminants may be adsorbed through the skin as a result of direct contact with soil. The degree of exposure is largely dependent on the concentration of the contaminant in the soil, the exposed skin area, the absorption rate, and the frequency of contact with soil. Exposure is expected to occur more frequently for workers, since the workers are present at the site more

**Table 5**  
**Conceptual Exposure Model of**  
**Potential Human Exposure Pathways**

<b>Contaminated Media</b>	<b>Release Mechanisms</b>	<b>Transport Media</b>	<b>Exposure Points</b>	<b>Exposure Media/ Exposure Routes</b>	<b>Potential Receptors</b>
Soil	None	None	On-site	Incidental Soil/Dust Ingestion Dermal Absorption	Site Worker/ Trespasser/ Resident
Groundwater	None	Groundwater	Off-site	Ingestion and Dermal Absorption from Groundwater	Residents
Groundwater	Volatilization	Air	Off-site	Inhalation of Vapors while Showering	Residents
Sediments	None	None	Off-site	Incidental Ingestion/ Dermal Absorption	Recreational Users/Residents/ Workers
Surface Water	None	None	Off-site	Incidental Ingestion/ Dermal Absorption	Recreational Users/Residents/ Workers

regularly than children are. Adults are expected to receive dermal exposures primarily while conducting grounds maintenance, excavating, or trespassing at the site. Children may be exposed to site contaminants while playing on the site grounds.

#### **b) Risks from Groundwater**

Low levels of groundwater contamination have been detected in both downgradient residential wells and downgradient monitoring wells. The highest concentrations of contaminants found in the residential wells were the ones used to calculate risk under a current use scenario.

The use of groundwater for showering or other general washing and bathing activities may result in inhalation exposures to contaminants released as vapors. This is expected to be potentially significant especially for the VOCs present in the aquifer. In addition, these same activities result in either whole or partial body contact with contaminated water, potentially resulting in absorption of contaminants through the skin.

The detailed quantification of exposures included analysis of water ingestion, inhalation, and skin absorption. The current extent of exposure to residents by these pathways is low.

### **2. Receptors and Quantification of Chemical Intakes**

The key receptor groups include the site worker, the child trespasser, and current and potential future residents. Young children (0-6 years old) were chosen for evaluation based on their small body size and increased sensitivity to contaminant exposure. Adults were also chosen for evaluation, since certain exposures that would not be expected to result in adverse effects over the short term may result in potential problems after long term (chronic) exposure.

Estimated daily intakes of the selected contaminants of potential concern are calculated for each of the exposed individuals identified for each exposure pathway. Daily intakes are calculated separately for carcinogenic and non-carcinogenic effects in accordance with methodology presented by EPA. Daily intakes for residential receptors are calculated separately for both a child and an adult.

The degree of exposure via each pathway is determined by behavioral, chemical, and physiological factors. Behavioral factors include the amount of time spent in contact with the contaminants in soil and water. Chemical factors affecting the degree of exposure relate to the tendency for a compound to be absorbed through the skin and the tendency for a chemical to bioaccumulate, as well as the physical state of a chemical in the environment (e.g., solubilized in water). Physiological parameters such as the condition of the skin (i.e., degree of hydration and skin breaks) and the ability of the body to metabolize and eliminate the contaminants also determine the amount and type of exposure that may occur.

#### **D) Risk Characterization**

The non-carcinogenic and carcinogenic health risks associated with each of the pathways and potential receptors listed above have been evaluated. Basic toxicity information used to calculate risk was derived from the Integrated Risk Information System (IRIS) and the Health Effects Assessment Summary Tables (HEAST).

## 1. Non-carcinogenic Health Risks

Reference doses (RfDs) are daily exposure levels for humans, including sensitive individuals, which have been developed by EPA for estimating the potential for adverse health effects from exposure to chemicals exhibiting non-carcinogenic effects. RfDs are expressed in units of mg/kg-day and are calculated for daily exposure over a lifetime. Estimates of actual intakes of chemicals from environmental media (e.g., the amount of a chemical ingested from contaminated drinking water) can be compared to the RfD. RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans). These uncertainty factors help ensure that the RfDs will not underestimate the potential for adverse non-carcinogenic effects to occur. Potential concern for non-carcinogenic effects of a single contaminant in a single medium is expressed as the hazard quotient (HQ) (or the ratio of the estimated intake derived from the contaminant concentration in a given medium compared to the contaminant's RfD). By adding the HQs for all contaminants within a medium or across all media to which a given population may reasonably be exposed, the Hazard Index (HI) can be generated. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media. Any HI value greater than 1.0 suggests that a non-carcinogen potentially presents an unacceptable health risk.

### a) Noncarcinogenic Risks for Site Worker and Site Trespasser

The non-carcinogenic risks due to inorganic and organic contaminants associated with site worker and child trespasser exposures are summarized in Table 6. Current and future risks for site worker and child trespasser exposures were calculated by assuming that future concentrations of contaminants will be about the same as current levels. The total HIs for the site worker range from 0.018 to 0.0026. The total HIs for the child trespasser range from 0.044 to 0.007. (Total HIs are calculated by adding the RME inorganic to the RME organic, or by adding the RAE inorganic to the RAE organic). Since all pathway specific and total non-carcinogenic HIs are less than one, no significant non-carcinogenic health threat is expected.

**Table 6 Summary of Noncarcinogenic Health Risks  
Associated with Site Worker and Site Trespasser  
Exposure Scenario**

	Inorganic		Organic	
	RME*	RAE**	RME	RAE
Site Worker	0.0082	0.0018	0.0096	0.0008
Site Trespasser (Child)	0.024	0.0054	0.02	0.0016
* RME - Reasonable Maximum Exposure				
** RAE - Representative Average Exposure				

## b) Noncarcinogenic Risks for Residents

The total non-carcinogenic HIs for current residential exposures range from 0.02 to 0.0084 for adults and 0.047 to 0.024 for children. Since all pathway specific and total HIs are less than one, there is no significant non-carcinogenic health threat associated with current residential use of the groundwater.

The future noncarcinogenic risks associated with residential exposure for adults and children are summarized in Table 7. The total adult HIs ranged from 0.99 to 0.34. The total child HIs ranged from 1.1 to 2.3. Although the total HI does not exceed one for adults, the total HI for the child is greater than one. Ninety-five percent of this risk is derived from the inorganic contaminants, including arsenic (HI=0.55) and zinc (HI=0.54). Arsenic exposure may result in dermal lesions. Zinc exposure has been found to lower the blood copper level, resulting in hypocupremia. However, the toxicologies of the inorganic contaminants suggest that an organ specific HI will not exceed one for the reasonably maximally exposed child.

The primary exposure route under this scenario is ingestion of groundwater, the assumption being that the concentration of inorganic compounds found at the most contaminated monitoring wells will become a source of drinking water. This could occur only if a drinking water well were to be installed on-site directly into the upper, unconfined aquifer, or that contaminants present in that aquifer were to migrate undiluted to an existing drinking water well off-site. No drinking water wells presently exist in the unconfined aquifer from which the samples with inorganic contaminants were taken.

**Table 7 Total Future Noncarcinogenic Health Risks  
Associated with Residential Exposure  
for Adults and Children**

	Inorganic		Organic	
	RME	RAE	RME	RAE
Adults	0.89	0.32	0.1	0.011
Children	2.1	1.1	0.26	0.04

## 2. Carcinogenic Health Risks

Cancer potency factors (CPFs) have been developed by EPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risk associated with exposure to potentially carcinogenic chemicals. CPFs, which are expressed in units of (mg/kg-day)<sup>-1</sup>, are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to provide an upper-bound estimate of the excess



lifetime cancer risk associated with exposure at that intake level. The term "upper-bound" reflects the conservative estimate of the risks calculated from the CPF. Use of this approach makes underestimation of the actual cancer risk highly unlikely. Cancer potency factors are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans).

Excess lifetime cancer risks for exposure to contamination at Superfund sites are determined by multiplying the intake level with the cancer potency factor for each contaminant of concern. These risks are probabilities that are generally expressed in scientific notation (e.g.  $1 \times 10^{-6}$ ). An excess lifetime cancer risk of  $1 \times 10^{-6}$  indicates that, as a plausible upper-bound, an individual has a one in one million chance of developing cancer as a result of exposure to a carcinogen over a 70 year lifetime under the specific exposure conditions at the site. EPA generally attempts to reduce the excess lifetime cancer risk posed by a Superfund site to a range of  $1 \times 10^{-4}$  to  $1 \times 10^{-6}$  (1 in 10,000 to 1 in 1 million), with emphasis on the most protective end ( $1 \times 10^{-6}$ ) of the scale.

Table 8 presents a summary of the carcinogenic risks due to inorganic and organic contaminants associated with site soil exposure to both the site worker and child trespasser. The RI report assumed that the concentrations of contaminants in the soil and the land use assumptions are the same for both current and future exposure scenarios. As a result, current and future risks were assumed to be identical. The total carcinogenic risk to the site worker for all pathways (soil ingestion and dermal absorption) combined range from  $1.1 \times 10^{-6}$  to  $8.0 \times 10^{-8}$ . Therefore; no significant carcinogenic health risks to a site worker under these exposure scenarios are expected. The highest cancer risk estimates are associated with the dermal absorption pathway, which had a risk level of  $1.1 \times 10^{-6}$  for the reasonably maximum exposure. Most of the carcinogenic risk is due to bis(2-ethylhexyl)phthalate, which could potentially be a laboratory contaminant. The total carcinogenic risk to the child trespasser for both pathways combined range from  $5.2 \times 10^{-7}$  to  $3.9 \times 10^{-8}$ . Under these exposure scenarios no significant carcinogenic health risks are expected to a child trespasser.

The total adult carcinogenic risk levels for all combined pathways under current residential exposures range from  $7.6 \times 10^{-5}$  to  $1.2 \times 10^{-5}$ . The highest cancer risks are associated with the ingestion and dermal absorption of water. Similarly, the total child carcinogenic risk levels for all pathways combined under current residential exposure range from  $3.2 \times 10^{-5}$  to  $2.1 \times 10^{-5}$ . Exposure to 1,2-dibromoethane accounts for more than 90 percent of the total pathway risk. This contaminant was detected in one residential well (RW-30) at a level of  $0.03 \mu\text{g/l}$ . This level is less than the proposed MCL of  $0.05 \mu\text{g/l}$ .

#### **E) Environmental Risks**

A preliminary ecological assessment was performed on the site. Based on the qualitative analysis performed the risks associated with exposure to terrestrial, aquatic, and avian wildlife species are minimal. No species are currently, or expected in the future to receive, receiving exposure to the contaminants of concern.

**Table 8 Summary of Carcinogenic Health Risks  
Associated with Site Worker and Site Trespasser  
Exposure Scenario**

	Inorganic		Organic	
	RME	RAE	RME	RAE
Site Worker	NA	NA	$1.1 \times 10^{-6}$	$8.0 \times 10^{-8}$
Site Trespasser (Child)	NA	NA	$5.2 \times 10^{-7}$	$3.9 \times 10^{-8}$
NA - Not Applicable				

#### **F) Risk Summary**

Based on the results of the Baseline Risk Assessment performed at the GTOS Site, EPA has determined that conditions at the site due to organic compounds pose no significant current or future risk to human health or the environment. The GTOS site does appear to exhibit trace amounts of inorganic contamination which results in slightly elevated calculations of potential future risk. The potential future risks discussed in the risk assessment are associated with ingestion of drinking water contaminated with inorganic compounds, particularly arsenic and zinc. Under this exposure scenario, the child future use, the HI would exceed one. The HIs ranged from a RAE of 1.1 to a RME of 2.1.

It is important to note that the analysis performed is very conservative and that no contaminant levels detected in any of the monitoring wells or residential wells exceeded MCLs. The Risk Assessment assumes that the inorganic compound concentrations found in the groundwater will eventually reach residential wells without dilution. This assumption is considered unlikely, as the inorganic contamination was found primarily in the unconfined upper aquifer and all drinking water wells are currently in the semi-confined aquifer. Theoretically, the detected levels of inorganics could be the result of background contamination.

EPA makes risk management decisions based on a number of different factors, taking into consideration specific site-related information as well as standardized methodologies for calculating exposure and overall risk probability. In this case, EPA has determined that the level of inorganic contamination present at the GTOS site does not appear to pose an unacceptable health risk to the public.

While EPA has determined that conditions at the site do not warrant further remedial action, EPA will continue to monitor the groundwater for a period of twelve months.

## **VII. EXPLANATION OF SIGNIFICANT CHANGES**

There are no significant changes from the recommended alternative described in the proposed plan.

## **VIII. STATUTORY AUTHORITY FINDING**

EPA has determined that conditions at the site due to contamination by organic compounds pose no current or potential threat to human health or the environment. While the GTOS site does appear to exhibit trace amounts of inorganic contamination which result in slightly elevated calculations of potential future risk, EPA has also determined that the presence of these compounds does not appear to pose an unacceptable risk to human health or the environment. Accordingly, no further remedial action will be undertaken. EPA will, however, continue to monitor the inorganic contaminants in the groundwater for a period of twelve months.

As this is a decision for "No Action", the statutory requirements of CERCLA Section 121 for remedial actions are not applicable and no five year review will be undertaken.